DECLARATION

I, Maho KASEKI, c/o the Inoue & Associates of 3rd Floor, Akasaka Habitation Building, 3-5, Akasaka 1-chome, Minato-ku, Tokyo, Japan do solemnly and sincerely declare that I am conversant with the Japanese and English languages and that I believe that the instantly amended paragraph beginning on page 62, line 2 of the present specification is a true and correct translation of the corresponding portion of the international application No. PCT/JP00/05791 which is attached hereto, and that the English expression "rhombic openings" in the amended paragraph beginning on page 62, line 2 of the present specification is a correct English translation of the Japanese expression "菱形の開口部" appearing at page 38, line 10 of the original Japanese PCT specification.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements jeopardize the validity of the application or any patent issued thereon.

January 15, 2004
(Date)

Maho KASEKI

４８ｃｍ^{2}で、陽極側気液分離室２７のみ図２と同様な構造とした。すなわち、陽極側気液分離室２７の第１通路Ａの幅Ｗが５ｍｍとなるように、気液分離室の全長にわたる長さを有し、高さＨ’が５０ｍｍで厚み１ｍｍのチタン製板（孔を有さない）を、気液分離室２７の孔５が局在する有孔底部壁４Ａに溶接によって取付け、そのチタン製板の上端から垂直に気液分離室２７の上端までの高さで、開口率約５９％、厚み１ｍｍのチタン製エクスパンデッドメタル２（垂直方向の対角線の長さが４ｍｍ、水平方向の対角線の長さが７ｍｍの菱形の開口部を１０ｃｍ^{2}当たり３５個有する多孔板）を溶接によって取り付けた。こうして、チタン製板と多孔板２からなる気泡除去用仕切壁３によって、陽極側気液分離室２７を、孔５が局在する有孔底部壁４Ａの有孔域を有する第１通路Ａと、孔５が局在する有孔底部壁４Ａの該非有孔域を有する第２通路Ｂとに仕切った。

陽極側気液分離室２７の有孔底部壁４Ａの孔５は、短径５ｍｍ、長径２２ｍｍの楕円型のものを３７．５ｍｍピッチで設けた。陽極側気液分離室２７の有孔底部壁４Ａの開口率は、第１通路Ａの底部面積（即ち、「第１通路Ａの幅Ｗ×気液分離室の長さ」）に対して５６％であった。

陰極側気液分離室２７の有孔底部壁４Ａの孔５は、直径１０ｍｍのものを２０ｍｍピッチで設けた。

バッフルプレート２１としては、図７の断面形状を有する

THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants	:	Yasuhide NOAKI et al.
Serial No.	:	10/019,948
Filed	:	January 7, 2002
For	:	UNIT CELL FOR USE IN AN AQUEOUS ALKALI METAL CHLORIDE SOLUTION ELECTROLYTIC CELL
Art Unit	:	1742
Examiner	:	Harry. D. Wilkins, III

DECLARATION

I, Yasuhide NOAKI, a Japanese citizen residing at 31-8, Chitoseshinmachi, Takatsu-ku, Kawasaki-shi, Kanagawa-ken, Japan declare and say:

I was graduated from the Department of Chemical Engineering, Faculty of Engineering, Yokohama National University, Japan, in March 1974.

I entered Asahi Kasei Kogyo Kabushiki Kaisha in April 1974. I have been engaged in the chlor-alkali electrolytic production and technology development of the same from April 1974 to date.

I am one of the applicants of the above-identified application and I am well familiar with the present case.

I have read and understood the Office Action dated August 28, 2003 issued in the present case and the references cited therein.

I carried out Examples 1-3 and Comparative Examples 1-2 of the present application, and the results are as described on pages 61 to 75 of the present specification.

I have performed experiments to evaluate the influences of the aperture ratio and average aperture area of the apertured segment of a bubble removing partition wall (provided in a unit cell for use in a bipolar, filter press type, aqueous alkali metal chloride solution electrolytic cell) on the occurrence of vibrations in an electrolytic cell. The method and results are as described in a paper attached hereto and marked "Exhibit 1".

It can be fairly concluded from the results:

(1) that, when both of the aperture ratio and the average aperture area were within the respective ranges (aperture ratio = **30 to 70 %**, and average aperture area = **3 to 60** mm^2) defined in claim 1 of the present application (i.e., in the case of the cell of Example 1 of the present application and cells 1 to 4 using the unit cells of the present invention), the vibrations in the electrolytic cell (in terms of the height of a water column) were **advantageously small**, i.e., **less than 50** mmH_2O, even at a current density **as high as 60 or 80** A/dm^2;

(2) that, on the other hand, in the case of comparative cell 1 which has an aperture ratio of **20 %** (which is **lower than** the range (30 to 70 %) defined in claim 1 of the present application) and an average aperture area of 3.0 mm^2, the vibrations in the electrolytic cell were **disadvantageously high**, i.e., **100 to 150 mmH_2O**, at **60 A/dm^2**;

(3) that, in the case of comparative cell 2 which has an aperture ratio of **80 %** (which is **higher than** the range (30 to 70 %) defined in claim 1 of the present application) and an average aperture area of 3.0 mm^2, the vibrations in the electrolytic cell were **disadvantageously high**, i.e., **60 to 110 mmH_2O**, at **60 A/dm^2**;

(4) that, further, in the case of comparative cell 3 which has an aperture ratio of 30 % and an average aperture area of **2.0** mm^2 (which is **lower than** the range (3.0 to 60 mm^2) defined in claim 1 of the present application), the vibrations in the electrolytic cell were **disadvantageously high**, i.e., **60 to 110 mmH_2O**, at **60 A/dm^2**;

(5) that, in the case of comparative cell 4 which has an aperture ratio of 30 % and an average aperture area of **70.0** mm^2 (which is **higher than** the range (3.0 to 60 mm^2) defined in claim 1 of the present application), the vibrations in the electrolytic cell were **disadvantageously high**, i.e., **120 to 170 mmH_2O**, at **60 A/dm^2**;

(6) that, in the case of comparative cell 5 which has an aper-

ture ratio of 70 % and an average aperture area of **70.0** mm^2 (which is **higher than** the range (3.0 to 60 mm^2) defined in claim 1 of the present application), the vibrations in the electrolytic cell were **disadvantageously high**, i.e., **100 to 150** **mmH_2O**, at a current density **of 60 A/dm^2** (see Exhibit 1); and

(7) that, from items (1) to (6) above, it is apparent that both of the above-mentioned specific aperture ratio and average aperture area which are defined in claim 1 of the present application are **critical** for suppressing the occurrence of vibrations in the electrolytic cell even when the electrolytic cell is operated at a current density as high as 60 or 80 A/dm^2, thereby preventing the occurrence of the adverse effects of vibrations, such as the occurrence of a breakage of an ion exchange membrane.

The undersigned petitioner declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

January 14. 2004

Date

Yasuhide Noaki

Yasuhide NOAKI

Exhibit 1

Experiments to evaluate the influences of the aperture ratio and average aperture area of the apertured segment of a bubble removing partition wall (provided in a unit cell for use in a bipolar, filter press type, aqueous alkali metal chloride solution electrolytic cell) on the occurrence of vibrations in an electrolytic cell

1. Object of the experiments:

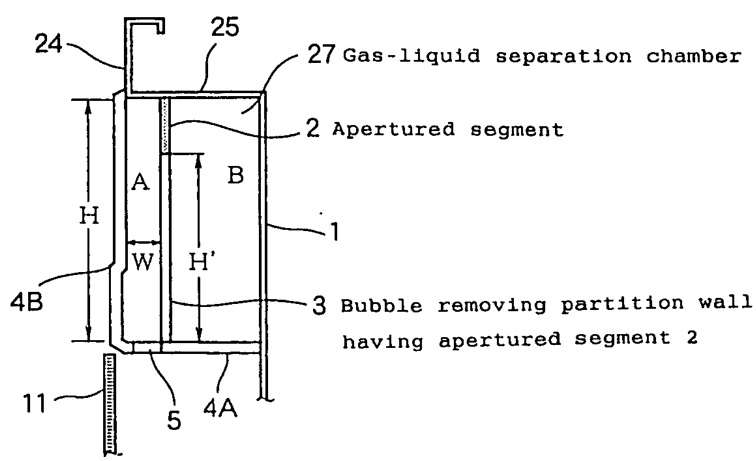
As can be seen from instantly amended claim 1 of the present application, the unit cell of the present invention has a bubble removing partition wall having an apertured segment, wherein the aperture ratio of the apertured segment (based on the area of the apertured segment) is in the range of from 30 to 70 % and the average area of the apertures of the apertured segment is in the range of from 3 to 60 mm^2. In the present invention, the above-mentioned specific aperture ratio and average aperture area are **critical** for suppressing the occurrence of vibrations in the electrolytic cell even when the electrolytic cell is operated at a current density as high as 60 or 80 A/dm^2, thereby preventing the occurrence of the adverse effects of vibrations, such as the occurrence of a breakage of an ion exchange membrane. In order to sub-

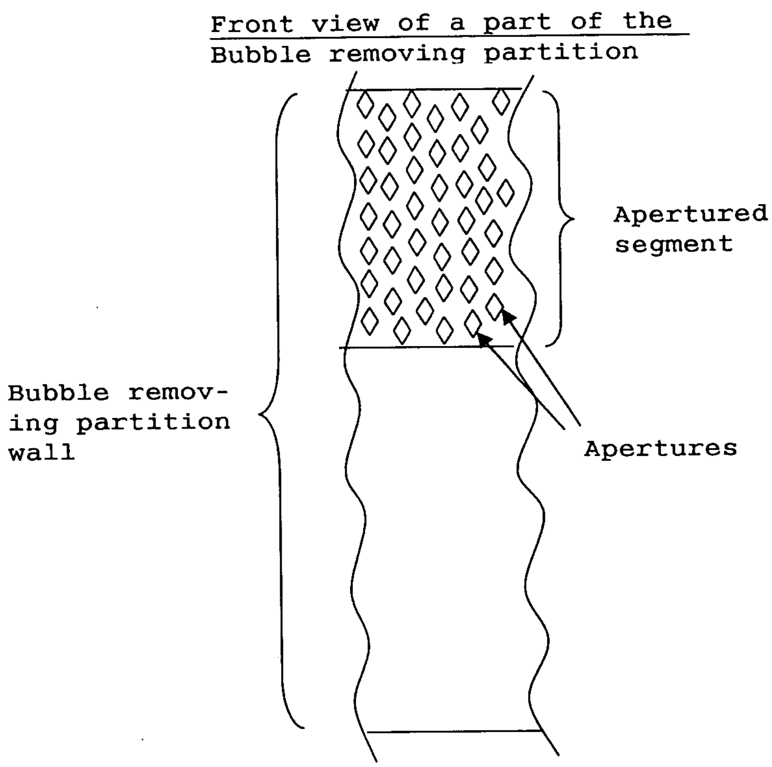
stantiate this, experiments are conducted as follows.

2. Method and Materials:

Bipolar, filter press type electrolytic cells (i.e., cells 1 to 4 using the unit cells of the present invention and comparative cells 1 to 5) were assembled in substantially the same manner as in Example 1 of the present application (described at page 61, line 7 to page 69, line 4 of the present specification) except that the aperture ratio of the apertured segment and the average area of the apertures of the apertured segment were varied as shown in Table A. The gas-liquid separation chamber each of the assembled electrolytic cells had a structure as shown in Fig. 2 of the present application. For easy reference, Fig. 2 of the present application is reproduced below (some explanations have been added) and a diagrammatic front view of a part of the bubble removing partition wall.

FIG.2





Using each of the assembled electrolytic cells, an electrolysis was performed at a current density of 60 A/dm^2 in the same manner as in Example 1 of the present application, and the vibrations in the electrolytic cell were determined in the same manner as in Example 1 of the present application.

Further, with respect to each of the electrolytic cell obtained in Example 1 of the present application and cells 1 to 4 (using the unit cells of the present invention), an electrolysis was also performed at a current density of 80 A/dm^2, and the vibrations in the electrolytic cell were de-

termined.

Table A

Electrolytic cell		Aperture ratio of apertured segment (%)	Average area of apertures (mm^2)
Present invention	Cell of Ex. 1 of the present application	**49**	**14.0**
	Cell 1	**30**	**3.0**
	Cell 2	**70**	**3.0**
	Cell 3	**30**	**60.0**
	Cell 4	**70**	**60.0**
Comparative	Comparative cell 1	20	**3.0**
	Comparative cell 2	80	**3.0**
	Comparative cell 3	**30**	2.0
	Comparative cell 4	**30**	70.0
	Comparative cell 5	**70**	70.0

Note: The values in boldfaced typing are values each of which is within the range defined in the present invention.

3. Results:

The results of the above experiments are shown in Table B below.

Table B

		Aperture ratio of apertured segment (%)				
		20	**30**	**49**	**70**	80
Average area of apertures (mm^2)	2.0	-	<Comp. cell 3> 60-110 mmH_2O at 60 A/dm^2	-	-	-
	3.0	<Comp. cell 1> 100-150 mmH_2O at 60 A/dm^2	**<Cell 1>** **Less than** **50 mmH_2O** at 60 and 80 A/dm^2	-	**<Cell 2>** **Less than** **50 mmH_2O** at 60 and 80 A/dm^2	<Comp. cell 2> 60-110 mmH_2O at 60 A/dm^2
	14.0	-	-	**<Ex. 1>** **Less than** **50 mmH_2O** at 60 and 80 A/dm^2	-	-
	60.0	-	**<Cell 3>** **Less than** **50 mmH_2O** at 60 and 80 A/dm^2	-	**<Cell 4>** **Less than** **50 mmH_2O** at 60 and 80 A/dm^2	-
	70.0	-	<Comp. cell 4> 120-170 mmH_2O at 60 A/dm^2	-	<Comp. cell 5> 100-150 mmH_2O at 60 A/dm^2	-

Present invention

3. Conclusion:

From Table B above, it is apparent that, when both of the aperture ratio and the average aperture area were within the respective ranges (aperture ratio = **30 to 70 %**, and average aperture area = **3 to 60** mm^2) defined in claim 1 of the present application (i.e., in the case of the cell of Example 1 of the present application and cells 1 to 4 using the unit cells of the present invention), the vibrations in the electrolytic cell (in terms of the height of a water column) were **advantageously small**, i.e., **less than 50** mmH_2O, even at a current density **as high as 60 or 80** A/dm^2.

On the other hand, in the case of comparative cell 1 which has an aperture ratio of **20 %** (which is **lower than** the range (30 to 70 %) defined in claim 1 of the present application) and an average aperture area of 3.0 mm^2, the vibrations in the electrolytic cell were **disadvantageously high**, i.e., **100 to 150** mmH_2O, at **60** A/dm^2. In the case of comparative cell 2 which has an aperture ratio of **80 %** (which is **higher than** the range (30 to 70 %) defined in claim 1 of the present application) and an average aperture area of 3.0 mm^2, the vibrations in the electrolytic cell were **disadvantageously high**, i.e., **60 to 110** mmH_2O, at **60** A/dm^2.

Further, in the case of comparative cell 3 which has an aperture ratio of 30 % and an average aperture area of **2.0**

claim 1 of the present application), the vibrations in the electrolytic cell were **disadvantageously high**, i.e., **60 to 110 mmH_2O**, at **60 A/dm^2**. In the case of comparative cell 4 which has an aperture ratio of 30 % and an average aperture area of **70.0** mm^2 (which is **higher than** the range (3.0 to 60 mm^2) defined in claim 1 of the present application), the vibrations in the electrolytic cell were **disadvantageously high**, i.e., **120 to 170 mmH_2O**, at **60 A/dm^2**. In the case of comparative cell 5 which has an aperture ratio of 70 % and an average aperture area of **70.0** mm^2 (which is **higher than** the range (3.0 to 60 mm^2) defined in claim 1 of the present application), the vibrations in the electrolytic cell were **disadvantageously high**, i.e., **100 to 150 mmH_2O**, at a current density **of 60 A/dm^2**.

From the above, it is apparent that both of the above-mentioned specific aperture ratio and average aperture area which are defined in claim 1 of the present application are **critical** for suppressing the occurrence of vibrations in the electrolytic cell even when the electrolytic cell is operated at a current density as high as 60 or 80 A/dm^2, thereby preventing the occurrence of the adverse effects of vibrations, such as the occurrence of a breakage of an ion exchange membrane.